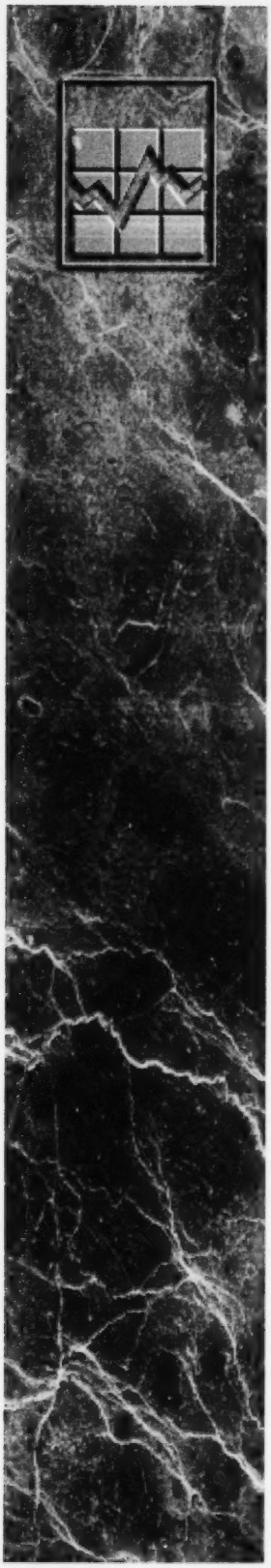

Income Statistics Division

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Survey of Financial Security
Methodology for estimating the value of employer pension plan benefits

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September 2001

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Statistics Canada
Income Statistics Division

Survey of Financial Security
Methodology for estimating the value of employer pension plan benefits

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For additional information on the Survey of Financial Security, see *The assets and debts of Canadians: an overview of the results of the Survey of Financial Security,* available on the Statistics Canada website (www.statcan.ca) under Products and Services, Free Publications, Personal Finance and Household Finance

Acronyms used in this document:

C/QPP	Canada/Quebec Pension Plan
CPI	Consumer Price Index
DB	Defined benefit
DC	Defined contribution
DPSP	Deferred profit sharing plan
GAM83	Group annuity mortality table
PA	Pension adjustment
PPIC	Pension Plans in Canada
RPP	Registered pension plan
RRIF	Registered retirement income fund
RRSP	Registered retirement savings plan
SFS	Survey of Financial Security
YMPE	Year's maximum pensionable earnings

The authors wish to thank Karen Dorman for her contribution to this document.

ABSTRACT

Initial results from The Survey of Financial Security (SFS), which provides information on the net worth of Canadians, were released on March 15 2001, in THE DAILY. The survey collected information on the value of the financial and non-financial assets owned by each family unit and on the amount of their debt.

Statistics Canada is currently refining this initial estimate of net worth by adding to it an estimate of the value of benefits accrued in employer pension plans. This is an important addition to any asset and debt survey as, for many family units, it is likely to be one of the largest assets. With the aging of the population, information on pension accumulations is greatly needed to better understand the financial situation of those nearing retirement. These updated estimates of the Survey of Financial Security will be released in late fall 2001.

The process for estimating the value of employer-sponsored registered pension plan (RPP) benefits is a complex one. This document describes the methodology for estimating that value, for the following groups:

a) persons who belonged to an RPP at the time of the survey (referred to as current plan members);
b) persons who had previously belonged to an RPP and either left the money in the plan or transferred it to a new plan;
c) persons who are receiving RPP benefits.

This methodology was proposed by Hubert Frenken and Michael Cohen. The former has many years of experience with Statistics Canada working with data on employer pension plans; the latter is a principal with the actuarial consulting firm William M. Mercer. Earlier this year, Statistics Canada carried out a public consultation on the proposed methodology. This report includes updates made as a result of feedback received from data users.

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1. INTRODUCTION

The Survey of Financial Security (SFS) will provide information on the net worth of Canadians. In order to do this, information was collected - in May and June, 1999 - on the value of the assets and debts of each of the families or unattached individuals in the sample. The value of one particular asset is not easy to determine, or to estimate. That is the present value of the amount people have accrued in their employer pension plan. These plans are often called registered pension plans (RPP), as they must be registered with Canada Customs and Revenue Agency. Although some RPP members receive estimates of the value of their accrued benefit, in most cases plan members would not know this amount. However, it is likely to be one of the largest assets for many family units.[1] And, as the baby boomers approach retirement, information on their pension accumulations is much needed to better understand their financial readiness for this transition.

This document describes the methodology for estimating the value of employer pension plan benefits for the following groups:

a) persons who belonged to an RPP at the time of the survey (referred to as current plan members);
b) persons who had previously belonged to an RPP and either left the money in the plan or transferred it to a new plan[2];
c) persons who are receiving RPP benefits.

The methodology for estimating the value of the benefit was proposed by Hubert Frenken and Michael Cohen. The former has many years of experience with Statistics Canada working with data on employer pension plans; the latter is a principal with the actuarial consulting firm William M. Mercer. Consultation was also received in the past from Watson Wyatt. The contribution of each is very gratefully acknowledged.

Estimating the value of these benefits is a complex process and has not previously been done by a Canadian asset and debt survey. Because of the large number of people for whom estimates must be made and the large variation in RPP provisions, it has been important to simplify the process as much as possible. Despite this, the estimate for each person will take into account their earnings, length of membership in the plan, age (where appropriate) and "simplified" plan provisions, and for that reason it is hoped the estimate will be a fair reflection of the value of their benefit. It would most certainly not, however, be as exact as one done for a specific plan member on termination of employment or as the result of a divorce.

The value that will be estimated will be that of the individual's RPP benefit and will not include the value of their Canada or Quebec Pension Plan benefits. To estimate the latter would require much more information than could reasonably be collected in an already demanding survey.

An earlier version of this paper, entitled *Survey of Financial Security - Estimating the value of employer pension plan benefits: A discussion paper* , was released in February 2001. This paper described and sought feedback on the proposed methodology for estimating the value of these benefits. It was sent to approximately 60 people and was also made available though the Statistics Canada Daily. Suggestions for modifications to the methodology were received from only a few organizations. Changes have been made as a result of these suggestions; they are incorporated in this document, which presents

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[1] *Family units includes both unattached individuals and families of two or more persons.*

[2] *These are referred to as deferred pensions. Estimates do not have to be done for persons who took the money out of the plan as this amount would either be part of their current assets or it would have been spent.*

the methodology that will be used. A summary of the comments received is presented in Appendix E.

2. VALUING PENSIONS OF CURRENT PLAN MEMBERS

2.1 Types of employer pension plans

Before outlining the methodology for estimating the value of pension benefits for current plan members, it is first necessary to describe briefly the two types of employer pension plans that are available, as the estimation procedure is quite different for each type. These types are referred to as defined contribution plans and defined benefit plans.

Defined contribution (DC) plans: These plans can be thought of much like a bank or an investment account. The employer and the employee (if the plan is contributory) each contribute a fixed amount to the plan, often a percentage of the employee's earnings. The contributions go into an account in the name of the plan member. The monies in this account are invested and the amount grows as additional contributions and investment earnings are added to it. When the plan member retires, the amount accumulated in the account is used to purchase an annuity or is converted to a product much like a registered retirement income fund (RRIF). The amount of the pension benefit is not known until the person retires; it depends on the amount that has been accumulated in the account. In 1998, the most recent year for which data are available, about 667,000[3] people belonged to defined contribution plans. That number represents about 13% of all members of registered pension plans.

Defined benefit (DB) plans: The majority of members of RPPs belong to defined benefit plans (in 1998, 4.3 million people, 85%[4] of all RPP members). In these plans, a specific benefit formula is defined, most commonly in one of two ways.

(1) Unit benefit DB plans: This is the most common type of DB plan, covering 80% of DB plan members. The benefit in these plans is defined as a percent of salary for each year of service (employment). A typical benefit would be 2% of the person's salary (averaged over a period of time), for each year of service. Most often the salary will be averaged over a number of years just prior to retirement; this average salary is referred to as the "earnings base". Therefore a person nearing retirement who meets the age requirements and has 30 years of service would have "earned" (accrued) a pension of 60% (2% per year times 30 years) of his average salary. If the average salary was $40,000, the person would receive the following annual pension:

    $40,000 X 2% X 30 = $24,000

(2) Flat benefit DB plans: The benefit in these plans, which cover the remaining 20% of DB plan members, is a fixed amount for each year of service. If, for example, that amount were $35 per month and the person had 30 years of service, the annual pension would be:

    $35 X 12 X 30 = $12,600

A number of things will affect the value of the benefit, for example, whether the pension is indexed and whether it is integrated with the Canada or Quebec Pension Plan. If the pension is integrated, the benefit is reduced at age 65, by an amount similar to the benefit paid by the Canada or Quebec Pension Plan.

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[3] *Information on RPPs and RPP plan characteristics has been taken from the 1998 Pension Plans in Canada database. The publication containing the most recent data is:* ***Pension Plans in Canada: Statistical Highlights and Key Tables****, January 1, 1999, Statistics Canada catalogue 74-401.*

[4] *Another 2% of RPP members belong to plans that combine the characteristics of defined benefit and defined contribution plans. This, together with the 85% in DB plans and 13% in DC plans, brings the total to 100%.*

2.2 Information collected on the survey related to RPPs

For the Survey of Financial Security, the decision was made not to ask people detailed questions about their pension plan or the value of the benefit. The value could, in theory, be provided by members of defined contribution plans, from the annual statement they receive[5]. However, focus group testing for the survey indicated that many people are not aware of the type of plan they belong to, and do not well understand the content of their statement, even if they have kept it. Interviewers would have had to receive extensive training about registered pension plans to properly aid the respondent. Given the amount of training that was required for the survey, the additional training about RPPs was adding a degree of difficulty that would not have been warranted.

Given the complexities outlined above, the option chosen for the survey was to estimate the value of the benefit by using information the respondent could provide, together with information about the provisions of the pension plan. The latter information is available in a database maintained by Statistics Canada which is called the Pension Plans in Canada (PPIC) database.

The information needed to estimate the present value of the benefit will depend whether the RPP is a defined benefit plan or a defined contribution plan (DB or DC). This information is outlined, by plan type, in Charts 1a and 1b.

2.3 How to estimate the value of the pension

The first step in the process is to match to the correct pension plan, for those respondents who indicate they belong to an RPP[6]. This can be done by using either the pension registration number (from the T4) or the name of the employer and pension plan; the respondent was asked to provide this information. A match must be done in order to obtain the required information on the plan provisions. If the match is unsuccessful, the industry of the employer will be identified and a value will be imputed based on typical provisions of plans in that industry (see Chart 2). As well, if a specific provision of an RPP from the PPIC database is coded as "other", for purposes of this estimation the most common provision for the industry in which that plan operates will be substituted. For example, if the employer contribution rate for a defined contribution plan has been coded as "other", a rate of 4.1% will be used; 3.1% will be used for employee contributions. This is the average contribution rate calculated from the PPIC database.

The process for deriving the estimate will be described for each of the two types of RPPs: defined contribution and defined benefit plans.

2.3.1 Defined contribution (DC) plans

For defined contribution plans, the match to the PPIC database is required only to determine that it is a DC plan. From that point on, the estimation process for these plans is relatively straightforward, although it is still an estimate. Ideally, the value of the benefit is calculated by totaling the amount contributed to the plan each year, plus the investment earnings on those contributions. However, because all of the required information is not available, it is proposed that the value of the benefit of defined contribution plans be estimated as follows:

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[5] *Members of defined benefit plans also receive a statement every year. That statement would indicate the amount that has been contributed to the plan but would not indicate the current value of the benefit. That value, in most cases, would be quite different than the amount contributed and must be determined through an actuarial calculation.*

[6] *The value of the pension will be estimated for the respondent's main job, as this is the job about which questions were asked. It is unlikely that they would belong to a pension plan in a secondary job but should that be the case, the value of that pension would not be included. Pensions will also be valued for persons who indicate they are temporarily absent from their job at the time of the survey; the period of absence is not known however and will not be considered in calculating the value of their benefit.*

Contributions made in 1998 X years of service X adjustment factor

The amount of the pension adjustment (PA) will be used whenever available as the amount of the 1998 contributions. It is requested in the SFS interview. For members of defined contribution plans, the PA is simply the total contributions made by the employee and the employer in a given year. If the PA was not provided by the respondent, the 1998 contributions will be used. That amount also was requested in the survey. If those too were not provided the contributions will be estimated using the contribution rate from the PPIC database.

The adjustment factor does two things:

- It "discounts" the employee's earnings over the period of membership in the plan. The amount contributed to the plan would have been lower when the employee's earnings were lower.
- It inflates the contributions to account for investment earnings on those contributions.

The adjustment factor used will depend on the years of service; it is described in Appendix B.

Example 1: Defined contribution plan

The respondent:

- has 20[7] years of plan membership;
- earned $40,000 and had a PA of $3,200 in 1998.

The plan:

- provides for combined employee and employer contributions of 8% of the employee's earnings.

Steps in the process:

(1) Multiply the employee and employer contributions for 1998 by the number of years of plan membership. In this case, because the PA is known, it can be used. The maximum PA or combined employee and employer contributions cannot be greater then $13,500 or 18% of the 1998 earnings, whichever is lower. This is the limit prescribed by the *Income Tax Act*.

$3,200 X 20 = $64,000

(2) The total contributions in the previous step must be adjusted to account for the fact that the respondent's salary (and therefore contributions) would have been lower in earlier years and for the fact that investment earnings on the contributions must be assumed. The adjustment factor of 1.45 is used for this purpose.

$64,000 X 1.45 = **$92,800**

---

[7] *Months also will be used in this calculation. If the respondent had been a member of the plan for 20 years and six months, the multiplier would be 20.5.*

2.3.2 Defined benefit (DB) plans

The process for estimating the benefit for defined benefit plans is much more complex. The estimation will differ for each of the following types of DB plans:

- unit benefit DB plan that is not integrated with the Canada or Quebec Pension Plan (C/QPP);
- unit benefit DB plan that is integrated with the Canada or Quebec Pension Plan (C/QPP);
- flat benefit DB plan (integration with the C\QPP is not considered for these plans).

Chart 1 lists the information required to estimate the present value of the pension for each of these.

For the purposes of valuing the benefit of DB plans, the amount contributed to the plan is not needed. However, additional information about the respondent is required: his/her age and marital status at the time of the survey. This information is provided by the respondent during the SFS interview. The value of the benefit of a DB plan will depend on the specific characteristics of the benefit promised by the pension plan. This information is available from the PPIC database.

The procedure seeks to estimate the amount of money that will be required at the time of retirement to pay the pension. This is done using a retirement factor which takes into account whether the benefit is indexed, whether a death benefit is provided and the years over which the benefit will be paid (assuming both the retirement age and life expectancy).

That amount must then be discounted to a present value, on the assumption that it would be invested and generate investment income. No assumption is made about future service, that is, only the service up to the time of the survey is considered. (Both the retirement and discount factors are further described in Appendix B; additional assumptions and exclusions are identified in Appendix C.)

A few points are worth noting about the examples that follow:

- The sex of the respondent need not be considered as the estimation is done using unisex mortality tables. Therefore, the factors used to value the pension, other things being equal, will be the same for men and women.

- The marital status of the respondent must be considered together with the death benefit provided by the plan. This is further explained in Appendix B. A single pensioner with a benefit that will cease on his/her death will receive what is referred to in this document as a life annuity. Some single pensioners have benefits that will be paid for a guaranteed period of time, even if the pensioner should die before that time. This slightly increases the value of the benefit. A married pensioner can receive either a benefit that is equivalent in value to a life annuity ("life equivalent") or can receive a joint and survivor pension. Both provide for a benefit for the spouse or partner but the initial benefit in a life equivalent pension is reduced so that the entire benefit is actuarially equivalent to a life annuity. As you will see from Appendix B the retirement factors (and therefore the value of the benefit) are lowest when the benefit is a life annuity and highest when it provides for a joint and survivor pension.

Example 2: Unit benefit defined benefit plan, not integrated with C/QPP

The respondent:

- earned $40,000 in 1998;

- had 20 years of plan membership;
- was 45 years of age and married at the time of the survey.

The plan:

- is a public sector plan;
- provides for a benefit that is not integrated with the C/QPP;
- defines the earnings base on which the benefit is calculated as the average earnings over the last five years' service;
- provides for a benefit, for each year of service, of 2.0% of average salary;
- provides for a fully indexed benefit;
- provides for a joint and survivor pension (see definitions in Appendix A).

Steps in the process:

(1) Calculate the average earnings over the last five years. To do this the 1998 income must be deflated. The deflator will be based on the growth in the average wage[8] over this time. In this example, 96% of the 1998 earnings (see Appendix C) will be used to estimate the average of the last five years' earnings.

$40,000 X .96 = $38,400

(2) Calculate the amount of annual pension accrued for each year of service (benefit rate of 2% times average earnings calculated in step 1). The result of this calculation can be no greater than $1,722, as this is the legislated limit on the benefit that can be paid for each year of plan membership.

2% X $38,400 = $768

(3) Calculate the annual pension accrued during the years of membership in the plan (20 years).

$768 X 20 = $15,360

(4) Estimate the amount needed at retirement to pay an annual pension of $15,360. A retirement factor (see Appendix B) is used to do this; it takes into account that: the plan is a public sector plan (and therefore assumes a retirement age of 60); the pension is indexed; a survivor benefit is provided; the amount will earn interest over the period the pension is being paid. The factor used in this case is 16.05. Therefore:

$15,360 X 16.05 = $246,528

(5) Calculate the present value of the amount estimated in step 4. The discount factor (see Appendix B) used to do this takes into account interest and the number of years to retirement (60-45=15). Because the pension in this example is fully indexed, the factor used will discount the value of the benefit 3.76% for each of the 15 years to retirement. Therefore the present value of the benefit is:

$246,528 X $(1/1.0376)^{15}$ = **$141,715**

Example 3: Unit benefit defined benefit plan, integrated with C/QPP

Many RPPs are integrated with the Canada or Quebec Pension Plan. In those cases an additional calculation must be made because the pension at age 65 is reduced by approximately the amount of the C/QPP payment. If the benefit were integrated with the

[8] *As reflected in the Year's Maximum Pensionable Earnings, the YMPE.*

C/QPP we assume that the value of the benefit from age 65 on must be reduced. Because the integration formulas can vary significantly, to simplify the process the assumption is made that the reduction in the benefit will be equivalent to 30% of the benefit calculated on earnings up to the Year's Maximum Pensionable Earnings (YMPE). The YMPE is the earnings on which the C/QPP contributions and benefits are based.

The plan is integrated with the C\QPP otherwise the situation is the same as in example 2. Therefore:

The respondent:

- earned $40,000 in 1998;
- had 20 years of plan membership;
- was 45 years of age and married at the time of the survey.

The plan:

- is a public sector plan;
- provides for a benefit that is integrated with the C/QPP;
- defines the earnings base on which the benefit is calculated as the average earnings over the last five years' service;
- provides for a benefit, for each year of service, of 2.0% of average salary;
- provides for a fully indexed benefit;
- provides for a joint and survivor pension (see definitions in Appendix A).

The first steps in the process estimate the value of the full benefit, not taking into account the reduction of the pension at age 65 when the integration formula takes affect.

(1) to (5) These steps are identical to those in example 2, resulting in a full benefit valued at:

$141,715

Additional steps required are:

(6) Determine the earnings base on which C/QPP benefits are based. For 1998 this would be the lower of $36,033 (the YMPE averaged for the years 1996, 1997 and 1998) or the person's earnings in 1998. In this case, because the person's earnings is more than $36,033, the earnings used are:

$36,033

(7) Multiply the earnings from step 6 by 30% of the benefit accrual rate (2% X .3 = .006) for each year of service to determine the amount by which the annual pension (from step 3 above) will be reduced at 65.

$36,033 X .006 X 20= $4,324

(8) Estimate the value of the amount in step 7 using the appropriate retirement factor from Appendix B (in this case 14.25).

$4,324 X 14.25 = $61,617

(9) Calculate the present value of the amount estimated in step 8 using the same discount factor used in step 5. In this case the years to receipt of the C/QPP is 20 (65 - 45). The reduction for the C\QPP need be valued only from age 65.

$61,617 X $(1/1.0376)^{20}$ = $29,451

(10) Deduct the value of the C/QPP reduction at 65 from the total value of the benefit.

$141,715 - $29,451 = **$112,264**

Example 4: Flat benefit defined benefit plan

The estimation process is almost the same for a flat benefit DB plan. The main difference is in the calculation to arrive at the accrued annual pension. In the case of a flat benefit plan, it is necessary only to multiply the annual fixed benefit by the years of service. Salary need not be considered as the benefit is defined without reference to salary.

The respondent:

- has 20 years of plan membership;
- is not married.

The plan:

- is in the private sector (therefore a retirement age of 62 is assumed);
- provides for a flat benefit of $35.00/month;
- provides for a benefit that is not indexed;
- provides that the pension will be paid for a guaranteed period of 60 months.

Steps in the process:

(1) Calculate the amount of annual pension accrued for each year of service.

$35.00 X 12 months = $420

(2) Calculate the annual pension accrued for service to date (20 years).

$420 X 20 = $8,400

(3) Estimate the amount needed at retirement to pay an annual pension of $8,400. The retirement factor used in this case (from Appendix B) is 11.55, because the plan is in the private sector, the benefit is not indexed but will be paid for a guaranteed period.

$8,400 X 11.55 = $97,020

(4) Calculate the present value of the amount estimated in the previous step. The discount factor (from Appendix B) used to do this takes into account interest and years to retirement (62-45=17). Because the pension in this example is not indexed, the factor used will discount the value of the benefit 6.25% for each of the 17 years to retirement. Therefore the present value of the benefit is:

$97,020 X $(1/1.0625)^{17}$ = **$34,615**

For flat benefit plans, integration with the C/QPP will not be considered as this information is not available on the PPIC database.

2.3.3 Two methods for valuing defined benefit pensions

(1) Defined benefit plans will be valued in two ways, one that will generate a **termination** value and the other a **going concern** value. Both assume that, for current plan members, only plan membership up to the time of the survey is considered.

The main differences between the two valuation methods are:

(1) In a going concern valuation even though future service is not considered, assumptions are made about **salary increases**. As most defined benefit plans base the amount of the pension on average earnings close to the time of retirement, assuming salary increases up to that time will obviously increase the value of the benefit. In a termination valuation, salary increases are not considered. However, in indexed plans, indexation would be included, both before and after retirement.

(2) **Interest rates** for a termination valuation are assumed based on current market rates. For a going concern valuation longer term interest rates are assumed.

(3) The going concern valuation method is applicable only for current members of defined benefit plans[9]. Those with deferred pensions (prior plan members) and those receiving benefits are no longer members of the plan so future salary increases need not be considered.

The value of the RPP for current plan members will be estimated on both a termination and a going concern basis. At this time, it is anticipated that the termination value will be used to estimate net worth, although the going concern value would also be available to users. The reason for this is:

- the value of other assets collected by SFS are as of the time of the survey;
- deferred pensions and pensions in pay are implicitly valued on a termination basis.

For current members of defined benefit plans the same basic approach is used for a going concern and termination valuation; the difference is the factors used. This can be seen in Appendix B. Going concern retirement factors are higher than termination factors because salary increases are considered. The difference in the resulting values is illustrated below.

The example that follows indicates how the value would differ on a going concern and termination basis using the respondent in example 2.

Example 5: Going concern versus termination valuation

The respondent:

- earned $40,000 in 1998;
- had 20 years of plan membership;
- was 45 years of age and married at the time of the survey.

The plan:

- is a public sector plan;
- provides for a benefit that is not integrated with the C/QPP;

[9] *Members of flat benefit DB plans could have the valuation done on a going concern basis even though their pension is not defined in relation to salary. The going concern valuation in this case accounts for future benefit rate increases (e.g., from $35/month per year of service to $38).*

- defines the earnings base on which the benefit is calculated as the average earnings over the last five years' service;
- provides for a benefit, for each year of service, of 2.0% of average salary;
- provides for a fully indexed benefit;
- provides for a joint and survivor pension (see definitions in Appendix A).

The first three steps in the process are the same for both termination and going concern valuations, that is:

(1) Calculate the average earnings over the last five years. To do this the 1998 income must be deflated; in this case , 96% of the 1998 earnings will be used to estimate the average of the last five years' earnings.

$40,000 X .96 = $38,400

(2) Calculate the amount of annual pension accrued for each year of service (benefit rate of 2% times average earnings calculated in step 1).

2% X $38,400 = $768

(3) Calculate the annual pension accrued for service to date (20 years).

$768 X 20 = $15,360

Differences emerge in the next steps, when factors are used:

Step	Termination	Going concern
4	Multiply the annual pension from step 3 by the appropriate termination retirement factor from Appendix B (16.05) to estimate the value of the pension at retirement. $15,360 X 16.05 = $246,528	Multiply the annual pension from step 3 by the appropriate going concern retirement factor from Appendix B (17.13) to estimate the value of the pension at retirement. $15,360 X 17.13 = $263,117
5	Discount the value in step 4 to a present value, given the person is 15 years from retirement. For a termination valuation the discount rate is 3.76% each year. $246,528 X $(1/1.0376)^{15}$ = **$141,715**	Discount the value in step 4 to a present value, given the person is 15 years from retirement. For a going concern valuation the discount rate is 2.14% each year. $263,117 X $(1/1.0214)^{15}$ = **$191,518**

The going concern valuation results in a higher pension value, because the factors used assume future salary increases and therefore a higher earnings base.

3. VALUING DEFERRED PENSIONS

Following changes to pension legislation in the last half of the 1980s, most plan members can remove the accumulated value of their pension from the RPP if they leave their employment (and their pension plan). This money can be transferred to a locked-in RRSP (called a Locked-in Retirement Account), taken as a lump sum (if less than a specified amount) or transferred to another RPP. The money can also be left in the plan. If the money has been put in an RRSP or received as a lump sum, it is not necessary to value the benefit for purposes of SFS, as the amount should either be reported as some other asset (most likely a locked-in RRSP) or it has been spent. If however the money was left in the plan or transferred to a new RPP, the pension should be valued, to provide a more comprehensive estimate of the person's wealth. These amounts are referred to as deferred pensions.

Although there are no broadly-based survey findings to corroborate this, the total value of these deferred pensions is thought to be quite small relative to the value of the pensions of current plan members. Given the opportunity to manage their own pension monies, it would seem many prefer that option. For that reason, and because the information available to estimate the value of these benefits is limited, a much simplified approach to valuing these pensions will be used.

The information that is available on prior pension participation is:

- length of membership in the plan;
- salary at the time employment and membership terminated;
- date at which membership terminated.

If the respondent belonged to more than one pension plan in the past, this information was asked only for the plan they belonged to the longest. This should have little impact on the results.

These benefits will be valued as if the plan were a defined contribution plan. Although it may be possible to match to the appropriate pension plan in the PPIC database, the pension registration number is not available to aid in this task and the provisions of the plan may have changed, if the plan still exists.

This approach is less refined than the one used for current plan members. However, given the limited information available to make this estimate, and the fact that relatively few people will have left money in their plan, this approach is will provide a reasonable and cost-effective estimate of the value of the deferred pensions.

The following steps are required:

(1) Inflate the salary to 1998 dollars using the growth in the YMPE. This is necessary because the respondent was asked to report their salary as of the time they left their employment. Without this salary adjustment the value of the benefit would be calculated as of the time that employment ended. The maximum salary that will be used is $75,000[10].

(2) Calculate the contributions to the plan assuming the employer and the employee contributed 4.1% and 3.1% respectively of the employee's salary for each year of plan membership. (This is the average contribution rate for defined contribution plans as determined from the PPIC database.)

[10] *Eighteen percent of $75,000 is $13,500, the maximum contribution that can be deducted, for tax purposes, for 1998. Although the contribution limit has changed over the years, the use of this limit should not significantly affect the quality of the estimate.*

(3) Multiply the contributions by the years of membership in the plan and by the same factors recommended for use with defined contribution plans.

Example 6: Deferred pension

The respondent:

- belonged to a pension plan for 8 years up to 1990;
- earned $25,000 in 1990.

The plan:

- is assumed to be a defined contribution plan with an employer and employee contribution rate of 4.1% and 3.1% respectively.

Steps in the process:

(1) Inflate the salary from 1990 to 1998 dollars. The YMPE grew 1.277 times over that period.

$25,000 X 1.277 = $31,925

(2) Calculate the amount contributed (7.2% of salary) in 1998 dollars.

$31,925 X .072 = $2,299

(3) Multiply the amount contributed in 1998 by the number of years of service.

$2,299 X 8= $18,392

(4) As in example 1, the total contributions in the previous step must be adjusted to account for the fact that the respondent's salary (and therefore contributions) would have been lower in earlier years and for the fact that investment earnings on the contributions must be assumed. The adjustment factor of 1.20 is used for this purpose.

$18,392 X 1.20 = **$22,070**

4. VALUING PENSIONS OF THOSE CURRENTLY RECEIVING RPPs

To complete the process of estimating the value of pension benefits, it is necessary to value not only those pensions that will be received in the future but also those pensions from RPPs that are now being paid. Valuing pensions in pay is a more straightforward task than valuing pensions that will be paid at some time in the future as one very important piece of information is known: the amount of the pension payment.

The information that was collected in the SFS to estimate the total amount required to pay the pension is:

- the amount of the pension payment;
- the age of the recipient;
- whether the person receiving the benefit has a spouse/partner;
- whether the pension is a survivor's pension, meaning that the respondent's spouse, who had originally been the recipient of the pension, had died;
- whether the benefit is indexed;
- whether, for those under 65, the pension payment reported includes a supplementary amount that will be no longer be paid beginning at age 65, when the C/QPP will replace the supplement. This must be taken into consideration as it would reduce the total value of the pension from the RPP.

If the respondent was receiving more than one employer pension, questions were asked only about the largest pension. This should not significantly affect the results. It is possible for a respondent to be collecting a survivor's pension and also belong to a plan as of the time of the survey. In that case both pensions would be valued.

Once again, because some of the information ideally required to estimate the value of the pension is not known, some simplifications and assumptions must be made. These are:

(i) - Form of pension: The pension, if the recipient has a spouse or common-law partner, is assumed to be a 60% joint and survivor pension, meaning that 60% of the pension will continue to be paid to the spouse, if still living, after the recipient dies. If the recipient does not have a spouse or partner it is assumed the pension ceases when the pensioner dies. If the respondent is receiving a survivor's pension, it is assumed they do not have a spouse.

(ii) - Number of years the pension expected to be paid: Mortality rates are age specific and are based on the Group Annuity Mortality Table (GAM83), which is a standard mortality table used by the pension industry.

(iii) - Indexation: Indexed and non-indexed pensions will be valued differently. However, the variation in indexation formulas will not be considered.

(iv) - Interest earned: The assumed rate of interest on the amount required to pay the pension is 6.25% annually, on average, over the period of time that the pension will be paid.

The maximum annual pension that can be provided from an RPP is $60,270 ($1,722 for each year of plan membership times up to 35 years in the plan). This limit will be imposed when valuing the benefit.

These four items have been combined into an actuarial factor table (see Pensions in pay factors, Appendix B); these factors will be used to estimate the value of the benefit. The sex of the recipient is not considered when calculating the value of the benefit as the mortality table used is a unisex table, i.e., the same for both men and women.

Example 7: Pension in pay for person over 65 or under 65 with no supplementary amount that will cease at 65

The res ɔndent:

- is 60 years of age and married.

The pension:

- is $20,000 annually (gross);
- is indexed;
- does not include a supplementary amount that will cease at age 65.

Steps in the process:

Multiply the gross annual pension by the actuarial factor for pensions in pay (from Appendix B).

$20,000 X 16.05 = **$321,000**

An additional calculation is required if the person is under 65 and is also receiving the supplementary payment referred to above. If that is the case, it is assumed that the pension is integrated with the C/QPP and that the payment from the RPP will be reduced at 65 by an amount approximate to the C/QPP payment. For purposes of estimating the value of the benefit it is necessary to deduct the value of the supplementary benefit from the total value. Because we do not know the amount of the C/QPP the person will receive at 65, the C/QPP is assumed to be 50% of the annual pension up to a maximum of $5,950 (two-thirds of the maximumC/QPP).

Example 8: Pension in pay for person under 65 receiving a supplementary amount that will cease at 65

The situation in this example is the same as in the previous one except that the person is receiving a supplementary amount that will cease at 65.

The respondent:

- is 60 years of age and married.

The pension:

- is $20,000 annually (gross);
- is indexed;
- includes a supplementary amount that will cease at age 65.

Steps in the process:

(1) Multiply the gross annual pension by the actuarial factor for pensions in pay (from Appendix B).

$20,000 X 16.05 = $321,000

(2) Calculate the value of the supplementary benefit, from age 65 onwards. The factor used in this case is always for a person 65 years of age. In this example it is 14.25 because the person is married and the benefit is indexed.

$5,950X 14.25 = $84,788

(3) Deduct the value of the supplementary payment from age 65 from the total value.

$321,000 - $84,788 = **$236,212**

Respondents over 65 are asked to report only the value of the benefit they receive from their employer and not the amount of the C\QPP, which would be a separate pension. It is therefore not necessary to make any adjustment to the value of the benefit of those over 65. This adjustment is also not necessary for those under 65 if their employer pension does not include a supplementary amount that will cease at 65.

5. CONCLUDING REMARKS

This paper describes the methodology for estimating the value of employer pension plan benefits for purposes of the Survey of Financial Security. Including such a value in the calculation of the net worth of Canadians is particularly important at this time, when many people are nearing retirement. Understanding the contribution that employer pensions make to the financial situation of current and future pensioners is essential, given it is one of the largest assets for many families and individuals.

The methodology for valuing these benefits aims to take into account as many key pieces of information as are available and can reasonably be accommodated. At the same time, it must use a number of assumptions and simplifications, so that it can be applied in a survey environment.

Chart 1a - Information available to value employer pension plan benefits

DEFINED BENEFIT PLANS

Unit benefit plan (based on final average, average best or career average earnings)		Flat benefit plans	Source
Not integrated with C/QPP	**Integrated with C/QPP[1]**		
Salary for 1998	Salary for 1998		SFS (employment earnings less tips, commissions) (questions J2a, J2b)
Salary adjustment factor	Salary adjustment factor		Derived from changes to YMPE (see Appendix C)
Benefit rate (e.g., 2% of salary for each year of service)	Benefit rate (e.g., 1.3% of salary up to the YMPE, 2% of salary over YMPE, for each year of service)	Benefit rate (e.g., $35 a month for each year of service)	PPIC (question 20)
Length of service	Length of service	Length of service	SFS (question F16e)
Retirement factor, calculated considering:	Retirement factor, calculated considering:	Retirement factor, calculated considering:	
- indexation of pension	- indexation of pension	- indexation of pension	PPIC (question 28)
- death benefit (life annuity, etc.)	- death benefit (life annuity, etc.)	- death benefit (life annuity, etc.)	PPIC (question 33)
- marital status	- marital status	- marital status	SFS (question A5)
- interest rate	- interest rate	- interest rate	Provided by W.M. Mercer (see Appendix B)
- retirement age (from sector of plan)	- retirement age (from sector of plan)	- retirement age (from sector of plan)	PPIC (question 7)
Discount factor, calculated considering:	Discount factor, calculated considering:	Discount factor, calculated considering:	
- indexation of pension	- indexation of pension	- indexation of pension	PPIC (question 28)
- sector of plan (for assumed retirement age)	- sector of plan (for assumed retirement age)	- sector of plan (for assumed retirement age)	PPIC (question 7)
- interest rate	- interest rate	- interest rate	Provided by W.M. Mercer (see Appendix B)
- age	- age	- age	SFS (question A3)

[1] *The information required to calculate the value of the benefit is the same for integrated and non-integrated unit benefit DB plans. The difference is that if the plan is integrated and the person is under 65 an additional calculation is required as described in example 3.*

Chart 1 b - Information available to value employer pension plan benefits

DEFINED CONTRIBUTION PLANS AND PENSIONS IN PAY

Defined contribution plans		Pensions in pay	
Information	**Source**	**Information**	**Source**
Amount contributed in 1998, from one of:		Amount of pension	SFS (question H9)
- pension adjustment	SFS (question F16d) or tax form[1]	Factor, calculated considering:	
- contributions to RPP in 1998	SFS (question F16c) or tax form[1]	- age of recipient	SFS (question A3)
- contribution rate and salary	PPIC (question 17) and SFS (question J2a, J2b)	- marital status	SFS (question A5)
Length of membership in plan	SFS (question F16e)	- indexation of benefit	SFS (question H10-12)
Discount factor	See Appendix B	- interest rate	Provided by M.W. Mercer (see Appendix B)
		Payment of supplementary amount until age 65	SFS (question H 8)
		Survivor's pension	SFS (question H5)
		Supplementary bridge benefit included (for those under 65)	SFS (question H8)

[1] *for those who authorized usage of tax information*

Chart 2 - Characteristics of typical industry pension plans
(To be used in cases where a plan match cannot be found)

Characteristic/ provision	Education, Health, Public Administration	Manufacturing, Construction, Trade, Primary industries	Transportation, Communication, Other utilities	Finance, Insurance, Real Estate	Other
Sector (public/private)	Public	Private	Private	Private	Private
Plan type: Defined benefit (DB) or Defined contribution (DC)	DB	DB	DB	DB	DC
Contribution rate	Not required	Not required	Not required	Not required	4.1% by employer; 3.1% by employee
Benefit rate	2% of final 5-year average salary per year of service	$35/month for each year of service	2% of final 5-year average salary per year of service	2% of final 5-year average salary per year of service	N/A
Integration with C/QPP	Yes	No	Yes	Yes	N/A
Indexing	Full	No automatic indexing	Partial	Partial	N/A
Death benefit - unmarried pensioner	Refund of contributions	Life annuity with guarantee period	Life annuity with guarantee period	Life annuity only	N/A
Death benefit - married pensioner	Joint and survivor pension with no initial reduction	Joint and survivor pension with initial reduction (actuarially equivalent)	Joint and survivor pension with initial reduction (actuarially equivalent)	Joint and survivor pension with initial reduction (actuarially equivalent)	N/A

These characteristics were developed using data from the Pension Plans in Canada database, examining plan provisions/characteristics for different ndustries

APPENDIX A - TERMS AND DEFINITIONS

Actuarial Assumptions: A set of estimates chosen by the actuary, of future events affecting the cost of benefits to be provided under a pension plan (e.g., mortality, salary increases, investment return, employee turnover, retirement ages).

Actuarially equivalent: Result of a calculation used to reduce or increase the amount of a benefit when taken in a form other than the normal form – at a different age, or with a different survivor conditions, etc. – but representing the same total value over the entire term of the expected payments.

Annuity: A series of predetermined periodic payments (usually monthly) provided by the terms of a contract between a issuer and an individual to continue for the lifetime of the individual or for a fixed period.

Average best earnings plan: A defined benefit RPP that defines the benefit formula using the highest average earnings for a specified number of years (e.g. best five years).

Benefit accrual: In the case of a defined benefit pension plan, the accumulation of pension credits for years of credited service, expressed in the form of an annual benefit to begin payment at normal retirement age. For example, the accrual rate could be 2% of salary for each year of service. In the case of a defined contribution plan, the accumulation of funds in the individual employee's pension account.

Benefit rate: The basis for determining payments to which participants may be entitled under a pension plan. Pension benefit rates usually refer to the employee's service or salary or both.

Canada/Quebec Pension Plans (C/QPP): These plans came into effect on January 1, 1966, and provide retirement and disability pensions as well as survivor benefits to the participants' spouses and dependent children. Participation is compulsory for most workers aged 18 and older, whether employees or self-employed.

Career average earnings plan: A defined benefit RPP that bases the pension on average earnings over the entire period of membership in the plan. The benefit at retirement can be expressed as a percentage of career average earnings. In some cases, earnings before a specific time are excluded; in others the earnings are indexed.

Consumer Price Index (CPI): An indicator of the changes in consumer prices experienced by a target population. The CPI measures price change by comparing, through time, the cost of a fixed basket of commodities.

Contribution rate: For an employee, a factor, such as a percentage of salary, used in determining the amount to be paid by the employee under a contributory plan. For an employer, a factor, calculated in an actuarial valuation, to be used in determining the employer's normal cost contribution under a pension plan. An employer's contribution rate may be either a percentage to be applied to the total compensation paid to covered employees for a particular year or an amount in dollars to be applied to the total number of covered employees at a particular date.

Death benefits: The amount payable from a pension plan to the beneficiary or estate of a member who dies before or after retirement. It may take the form of a lump sum payment or a continuing benefit to the spouse/partner.

Deferred pension: A specified pension determined when a member's employment or plan terminates that is not payable until pensionable age.

Defined benefit pension plan (DB): An RPP which defines the benefits by a formula stipulated in the plan text. The employer contributions are not predetermined but are a function of the cost of providing the promised pension, taking into consideration employee contributions, if any. DB plans can be subdivided into unit benefit and flat benefit plans.

Defined contribution pension plan (DC): An RPP that specifies the employee's (if the plan is contributory) and the employer's contributions. Members' benefits are provided from accumulated contributions plus the return on the investment of these monies.

Earnings base: The average salary used in calculating the pension benefit in a unit benefit RPP.

Employer pension plan (see RPP)

Factor – Adjustment: For purposes of this document, a factor used to estimate the value of the benefit of a defined contribution RPP which both discounts the employee's earnings and inflates the contributions for investment earnings on those contributions.

Factor – Discount: For purposes of this document, a factor used to estimate the present value of a defined benefit RPP. This factor takes into consideration interest and years to retirement.

Factor - Pensions in pay: For purposes of this document, a factor used to estimate the value of an RPP benefit that is currently being paid. This factor takes into account the type of death benefit, benefit indexation, interest and mortality.

Factor – Retirement: For purposes of this document, a factor used to estimate the value of a defined benefit RPP at the time of retirement. This factor takes into consideration the type of death benefit, benefit indexation, interest and mortality.

Final average earnings plan: A defined benefit RPP that defines the benefit formula using average earnings for a specified number of years immediately prior to retirement.

Flat benefit DB plan: A defined benefit RPP that provides a fixed benefit not related to earnings. The benefit is usually a dollar amount of monthly pension for each year of service.

Going concern RPP valuation: For the purpose of this document, the process of determining the value of an RPP benefit, assuming membership in the plan will continue and therefore that future salary increases must be considered.

Indexing: A provision in a pension plan calling for periodic adjustments to benefits (usually after retirement) according to a formula based on a recognized index of price or wage levels, e.g., the Consumer Price Index.

Integration: Provision in a pension plan which relates plan contributions and/or benefits to those of a government pension plan, e.g., Canada and Quebec Pension Plans.

Joint and survivor: An annuity payable for the lifetimes of both the plan member and his or her spouse or common-law partner. Most RPPs require that the pension of a married plan member take this form, unless this option is waived. Payments to the survivor are usually reduced after the member's death.

Life annuity only: Periodic payments made only during the lifetime of the annuitant and ceasing on his/her death.

Life annuity with guarantee period: An annuity which will be paid for the lifetime of a person, but in any event for a minimum guaranteed period; e.g., if annuity is guaranteed for

10 years and the annuitant dies after 6 years, payments will continue to a beneficiary or the estate for 4 years.

Locked-in Retirement Account (LIRA): A locked-in plan similar to an RRSP except that the assets originate from an RPP and they cannot be accessed until the designated retirement age. It must be converted to an annuity, LIF or LRIF before the end of the year in which the holder reaches age 69. Legislation regarding LIRAs may differ from one jurisdiction to the next.

Mortality table: A table showing expected rates of death at various ages for people born in various periods. Used by actuaries to arrive at mortality assumptions when estimating the cost of pensions for a group.

Offset method of integration: In an RPP, where contributions and/or benefits are reduced by all or part of contributions to and/or benefits from the C/QPP.

Pension adjustment (PA): Calculated value of the pension accrued in the year in an RPP or a DPSP, used to determine the amount that can be contributed to an RRSP.

Present value: Amount of money which, if invested today at a given rate of compound interest would provide a defined benefit commencing at a specified future date.

Registered pension plan (RPP): An employer-sponsored plan registered with Canada Customs and Revenue Agency and most commonly also with one of the pension regulatory authorities. The purpose of such plans is to provide employees with a regular income at retirement.

Registered Retirement Income Fund (RRIF): A fund into which RRSP monies may be transferred. Payments from an RRIF may be varied, but a minimum amount must be withdrawn annually.

Registered Retirement Savings Plan (RRSPs): A capital accumulation program designed to encourage saving for retirement. Contributions are tax-deductible within prescribed limits. Each year's RRSP contribution/deduction limit is reduced by the assessed value of benefits accrued in the prior year under an RPP or DPSP. Unused RRSP contribution room may be carried forward, with some restrictions. Investment income earned in the RRSP is tax-exempt, but benefits are taxable.

Step-rate method of integration: In an RPP, where two contributions and/or benefit rates exist, most commonly for earnings above and below the YMPE.

Supplementary (bridging) benefit: A supplemental benefit payable in addition to regular benefits under a pension plan to an employee who retires before becoming eligible for government benefits, but ceasing when OAS or C/QPP benefits are payable (or offset by those benefits).

Termination RPP valuation: For the purpose of this document, the process of determining value of an RPP benefit without assuming any salary increases and assuming current market value for interest rates.

Unit benefit DB plan: A type of RPP in which members earn a unit of pension, often expressed as a fixed percentage of earnings, for each year of credited service/participation. Includes career average, average best and final average earnings.

Year's Maximum Pensionable Earnings (YMPE): Maximum earnings on which contributions to and benefits from the C/QPP are determined.

APPENDIX B - FACTOR TABLES AND ACTUARIAL ASSUMPTIONS

The retirement, discount and pensions in pay factors to be used in the valuation process were provided by William M. Mercer Ltd.

The retirement factors given below were developed taking into account several provisions of defined benefit plans that have an impact on the value of the benefit. Because numerous options can apply to each of these provisions, it has been necessary to simplify them for estimation purposes. These provisions are:

1 - **Indexation**. Although a wide range of indexation formulas are specified by pension plans, to simplify the estimation process three levels of indexation will be used. This information will be derived from the data in the Pension Plans in Canada database. The three levels are:

- the pension is fully indexed to the cost of living (as measured by the Consumer Price Index, the CPI);
- the pension is partially indexed;
- the pension is not indexed.

Obviously, all other things being equal, the value of a fully indexed benefit will be higher than one that is partially or not indexed. The retirement factors reflect this.

2 - **Death benefit**. The value of the benefit will vary depending on the amount that remains to be paid after the death of the pensioner. Built into the retirement factors are three levels of death benefits, which are:

- Life annuity only, meaning that no amount remains to be paid when the pensioner dies. This will also be used for a married pensioner if the spouse's pension (called a joint and survivor pension) is equivalent in value to a life annuity. This would be the case if the original amount of the pension is reduced to provide for a survivor's benefit.
- Life annuity with a guarantee period meaning that the benefit is guaranteed for a minimum period of time, often 60 months, even if the pensioner dies before that time. This will apply only to single pensioners.
- A joint and survivor pension that is higher in value than a life annuity, because the initial pension is not reduced. The retirement factor is highest for this group.

The information required to determine which of the above applies for a given respondent will come both from SFS and PPIC.

3 - **Retirement age/life expectancy**. The specification of retirement ages by RPPs can take many different forms, although the age is most often 65. However, many people can retire before that time with a full pension, if they meet the necessary age and service requirements. To reflect the fact that retirement often takes place before 65[11] and that it tends to be lower for public sector workers, two retirement ages will be assumed, 60 for those working in the public sector and 62 for those in the private. The retirement factors are therefore higher for public sector workers, as the pension must be paid for a longer time. Mortality rates are based on the Group Annuity Mortality Table (GAM83), a standard industry mortality table.

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[11] *Monette, M., Canada's Changing Retirement Patterns: Findings from the General Social Survey, catalogue 89-546, September, 1996.*

A. Retirement Factors - used for current members of defined benefit plans

These factors bring together four variables:

- **Y** - the anticipated retirement age (60 for public sector, 62 for private). It is replaced by 65 for the C/QPP reduction factor
- **N** - indexing, three options for valuation on termination basis, two for going concern
- **D** - death benefits, three options
- **I** - interest

The following shows the factors for termination and going concern calculations. The C/QPP reduction factors are in *italics*. These factors are in all cases lower than the other factors as they apply from age 65, when the C/QPP reduction would take affect. The factors that are not in italics apply from the assumed retirement age, 60 for public sector plans and 62 for private sector plans.

(i) Termination valuation

f (Y, N, D, I)
f (65, N, D, I) for C/QPP offset

	Public Sector[1]			Private Sector[1]		
Death Benefit	**Indexed**	**Partially Indexed**	**Non-indexed**	**Indexed**	**Partially Indexed**	**Non-indexed**
Life annuity only, no guarantee	14.57 *12.70*	12.98 *11.48*	11.65 *10.44*	13.84 *12.70*	12.40 *11.48*	11.19 *10.44*
Life annuity with guarantee period	14.91 *13.28*	13.30 *12.02*	11.94 *10.95*	14.26 *13.28*	12.79 *12.02*	11.55 *10.95*
Joint & survivor	16.05 *14.25*	14.17 *12.77*	12.60 *11.52*	15.35 *14.25*	13.63 *12.77*	12.19 *11.52*

[1] *retirement age assumed to be 60 for the public sector and 62 for the private sector*

(ii) Going concern valuation

f (Y, N, D, I)
f (65, N, D I,) for C/QPP offset

	Public Sector[1]		Private Sector[1]	
Death Benefit	**Indexed**	**Non-indexed/ partially indexed**	**Indexed**	**Non-indexed/ partially indexed**
Life annuity only, no guarantee	15.47 *13.36*	12.75 *11.30*	14.64 *13.36*	12.19 11.30
Life annuity with guarantee period	15.82 *13.96*	13.06 *11.83*	15.07 *13.96*	12.57 *11.83*
Joint & survivor	17.13 *15.07*	13.90 *12.55*	16.32 *15.07*	13.38 *12.55*

[1] *retirement age assumed to be 60 for the public sector and 62 for the private sector*

Other assumptions recommended by William M. Mercer and built into the factors include:

	Going concern	Termination
Interest rates	7.25%	6.25%
Salary increases	5.0%	n/a
Inflation	4.0%	2.4%
Mortality	GAM83-unisex	GAM83-unisex

B. Discount factors - used for current members of defined benefit plans

This factor, identified as **V**, uses interest assumptions, shown as I, to calculate present values using the following formulas:

V = $1 \div (1 + I)^{**}$, where ** is the retirement age less the current age
V65 = $1 \div (1 + I)^{**}$, where ** is age 65 less the current age

For example, for a public sector member aged 45, V would equal $1 \div (1 + I)^{15}$, since the number of years between 45 and the anticipated retirement age of 60 is 15. V65 would be $1 \div (1 + I)^{20}$. The V65 factor is generally used when valuing the C/QPP reduction, which takes affect from age 65.
Note: V = 1 if current age ≥ retirement age and V65 = 1 if current age ≥ 65

I varies depending on whether the valuation is on a termination or going concern basis. On termination basis three different rates are provided, depending on whether the pension is fully, partially or non-indexed.

(i) Termination	**I**
fully indexed	3.76%
partially indexed	4.99%
non-indexed	6.25%
(ii) Going concern - all cases	2.14%

C. Pensions in pay factors

The factor **f(Y,N,T)** considers three variables

Y - the current age
N - whether pension is indexed
T(type) - joint & survivorship or single life

The existence of a supplementary bridge benefit payable before age 65 is considered as well. If such a supplementary benefit is present and the actual age is ≤ 65, the age 65 factors (*italics* below) are used in valuing the amount of the reduction, as the reduction takes affect at age 65.

f (Y,N,T)

Age	Indexed		Non-indexed	
	J & S	Single Life	J & S	Single Life
≤ 55	17.66	16.49	13.49	12.84
56	17.36	16.18	13.32	12.67
57	17.04	15.87	13.16	12.50
58	16.72	15.56	12.98	12.32
59	16.39	15.24	12.79	12.13
60	16.05	14.91	12.60	11.94
61	15.71	14.59	12.40	11.75
62	15.35	14.26	12.19	11.55
63	14.99	13.93	11.97	11.35
64	14.62	13.61	11.75	11.15
65	***14.25***	***13.28***	***11.52***	***10.95***
66	13.87	12.96	11.28	10.74
67	13.48	12.64	11.03	10.54
68	13.09	12.33	10.77	10.34
69	12.70	12.02	10.51	10.14
≥ 70	12.31	11.72	10.25	9.94

D - Adjustment factor for defined contribution plans

The adjustment factor does two things:

- it "discounts" the employee's earnings over the period of membership in the plan. The amount contributed to the plan would have been lower when the employee's earnings were lower.
- it inflates the contributions to account for investment earnings on those contributions.

The adjustment factor was determined assuming the following:

- a change in the respondent's salary over the period of membership in the plan equivalent to the change in the Year's Maximum Pensionable Earnings;
- a contribution rate of 7.2%, 4.1% by the employer and 3.1% by the employee;
- an annual rate of return on the contributions of 8%, compounded quarterly and beginning the year after the contributions were made.

The factor used will depend on the years of service, as indicated below:

Years of service	Adjustment factor
1 - 4	1.04
5 - 9	1.20
10 - 14	1.35
15 plus	1.45

The factors were determined by calculating the ratio between the actual contributions and investment earnings using the assumptions above and the 1998 contributions times the years of service. The table below illustrates the calculation of the factors.

				B		A			
Year	**YMPE**	Years of service[1]	Contrib.[2]	98 contrib. X years of serivce	Contrib. +earnings for each year[3]	Accumulated contrib. + earnings	Ratio A/B	Adjustment factor	
								Aver-age factor	For years of service
1998	$36,900	1	$2,657	$2,656.80	$2,656.80	$2,656.80	1.00	1.04	1-4 yrs
1997	$35,800	2	$2,578	$5,313.60	$2,790.08	$5,446.88	1.03		
1996	$35,400	3	$2,549	$7,970.40	$2,986.33	$8,433.20	1.06		
1995	$34,900	4	$2,513	$10,627.20	$3,186.84	$11,620.04	1.09		
1994	$34,400	5	$2,477	$13,284.00	$3,400.12	$15,020.16	1.13	1.20	5-9 yrs
1993	$33,400	6	$2,405	$15,940.80	$3,573.41	$18,593.56	1.17		
1992	$32,200	7	$2,318	$18,597.60	$3,729.00	$22,322.56	1.20		
1991	$30,500	8	$2,196	$21,254.40	$3,823.29	$26,145.85	1.23		
1990	$28,900	9	$2,081	$23,911.20	$3,921.35	$30,067.20	1.26		
1989	$27,700	10	$1,994	$26,568.00	$4,068.35	$34,135.56	1.28	1.35	10-14 yrs
1988	$26,500	11	$1,908	$29,224.80	$4,212.94	$38,348.50	1.31		
1987	$25,900	12	$1,865	$31,881.60	$4,456.97	$42,805.47	1.34		
1986	$25,800	13	$1,858	$34,538.40	$4,805.74	$47,611.21	1.38		
1985	$23,400	14	$1,685	$37,195.20	$4,717.99	$52,329.20	1.41		
1984	$20,800	15	$1,498	$39,852.00	$4,539.47	$56,868.67	1.43	1.45	15+ yrs
1983	$18,500	16	$1,332	$42,508.80	$4,370.33	$61,239.01	1.44		
1982	$16,500	17	$1,188	$45,165.60	$4,219.17	$65,458.18	1.45		
1981	$14,700	18	$1,058	$47,822.40	$4,068.75	$69,526.94	1.45		
1980	$13,100	19	$943	$50,479.20	$3,924.79	$73,451.72	1.46		
1979	$11,700	20	$842	$53,136.00	$3,794.30	$77,246.02	1.45		

1 assumes service from year in far left column until 1998.

2 assumes 7.2% of salary, 4.1% by employer and 3.1% by employee.

3 assumes 8% annual interest compounded quarterly (beginning the year after the contributions are made)

Appendix C - Miscellaneous exclusions and assumptions

1. **Marital status**: Where marital status is taken into consideration for valuation purposes, no differentiation is made between married couples and those living common-law. As well, the valuation is done on marital status at the time of the survey. Should the respondent marry or divorce in the future this could affect the value of the benefit.

2. **Pension splitting on divorce/separation**: It is possible that a portion of the value of the benefits of certain respondents may have been split with a former spouse or partner. Because the information to permit an estimation of this amount is not available, splitting of pension credits on divorce or separation will not be considered.

3. **Voluntary contributions**: Although additional voluntary contributions may have be made to the plan by the employee no information exists on these contributions for those in the SFS sample. It will therefore be assumed that none were made. Data from PPIC indicates that they constitute only about 3% of total employee contributions.

4. **Persons with less than two years of membership in an RPP**: These people are most often not entitled to the employer's contributions if they leave their job. Also, because pensions are often not locked-in until the person has been a plan member for at least two years, the employee's contributions are generally returned as a lump-sum. For those who belonged to a plan at the time of the survey, the valuation for people who have less than two years of plan membership will be done in the same manner as for persons with more than two years of service, on the assumption they will not terminate their employment. Deferred pensions will be valued only if the person had at least two years of membership in the plan.

5. **Salary/earnings base**: The salary available for estimation purposes is the employment earnings for 1998 less commissions and tips. In theory overtime, if applicable, should be removed but it is not possible to isolate this amount. The earnings base for most unit benefit DB plans is average earnings over a number of years. It is therefore necessary to deflate the 1998 earnings. This is done using the changes in the YMPE, as shown below.

YMPE		Earnings base - average wages over:			
		<5 years	5 years	> 5 years	10 years[1]
1998	$36,900	Use YMPE averaged over 1996-1998 (3 years) in all cases	YMPE averaged over 1994-1998 (5 years)	Use YMPE averaged over 1993-1998 (6 years) in all cases	YMPE averaged over 1989-1998 (10 years)
1997	$35,800				
1996	$35,400				
1995	$34,900				
1994	$34,400				
1993	$33,400	$36,033/ $36,900 = .98	$35,480/ $36,900 =.96	$35,133/ $36,900 = .95	$33,010/ $36,900 = .89
1992	$32,200				
1991	$30,500				
1990	$28,900	Deflator=.98 of 1998 earnings	Deflator=.96 of 1998 earnings	Deflator=.95 of 1998 earnings	Deflator=.89 of 1998 earnings
1989	$27,700				

[1] *an earnings base of 10 years will be used for all career average plans. These plans generally only consider earnings after a certain date.*

6. **Integration for flat benefit plans**: The PPIC database does not contain information on the integration of flat benefit plans with the C/QPP. Integration will therefore not be considered for these plans, which cover about 17% of all RPP members.

7. **Early retirement/disability pensions**: Although the estimation process does not consider future service after the date of the survey, the valuation is done assuming people will work until they can retire with an unreduced pension and that early retirement with a reduced pension and the need for the payment of disability benefits is not an issue.

8. **Number of pensions valued**: For current pension plan members, the value of the pension will be estimated for the respondent's main job, as this is the job about which questions were asked in the SFS interview. It is unlikely the respondent would belong to a pension plan in a secondary job but should that be the case the value of that pension would not be included.

   For deferred pension, if the respondent previously belonged to more than one pension plan, information was requested only for the plan they belonged to the longest. Only that pension will be valued.

   For pensions in pay, if the respondent was receiving more than one pension from an employer, questions were asked only about the largest pension. Therefore, only that pension can be valued.

   It is possible for a respondent to receive a survivor's pension and also belong to a pension plan at the time of the survey. In that case both pensions would be valued. As well, if a respondent belonged to a pension plan at the time of the survey and also had a deferred pension, both would be valued.

9. **Supplementary benefits for high-income plan members**: Plans that supplement the benefits from RPPs for high-income/executive employees are often called Supplementary Executive Retirement Plans (SERPs). In may cases SERPs are unfunded. If they are funded, it is generally through a Retirement Compensation Arrangement (RCA). The value of SERPs and the extent to which they are funded cannot be estimated in the same way as RPPs because there is no equivalent to the Pension Plans in Canada database (used by the SFS to value RPPs) for SERPs. Respondents to the survey were asked for the amount they had in executive and foreign pension plans; however, it cannot easily be determined whether SERPs were reported in this item, as the value of these plans would often not be known. Also, there is no aggregate benchmark information on the amount in these plans.

10. **Unisex mortality tables**: Unisex mortality tables are used in determining the factors for valuing RPP benefits. This was done to simplify the calculation procedure. There is no doubt that differences exist in the mortality patterns of men and women. Michael Cohen has estimated that the following difference in value will result using unisex and sex-distinct assumptions:

    - for pensions providing a life annuity the estimate for females would be about 8% higher and for males 8% lower using sex-distinct mortality tables rather than unisex tables;
    - for pensions providing a joint and survivor annuity (expected to be much more common) the differences would be much smaller (for females, 0%-2% higher and for males 0%-2% lower using sex-distinct mortality tables rather than unisex tables).

    Given that the valuation must be done using a number of assumptions (e.g., interest rates, inflation) and using somewhat simplified plan provisions, the use of unisex mortality tables is felt to generate estimates within an acceptable range of precision. Also, because asset and debt information for the SFS was collected at the family level it will not be possible to generate data on net worth by gender.

11. **50% rule**: This rule provides that on termination of membership (including retirement and death of the member), under a contributory plan, there may be a refund of the difference between the accumulated contributions and 50% of the value of the benefit. This can have an impact of the value of the RPP. This rule has not been considered in the methodology, for the following reasons:

    - The 50% rule is not universal; the federal government plan does not incorporate it nor do the plans of some federal agencies. The Pension Plans in Canada database, although it contains information on many plan provisions, does not contain information on the 50% rule.
    - This rule came into effect at different times in different provinces, from the late 1980s to the early 1990s.
    - The impact of the rule reduces and virtually disappears as employees get close to retirement.

12. **Bridging benefits**: Some plans provide a supplementary benefit until age 65, when the Old Age Security benefit and/or the Canada/Quebec Pension Plan benefit become payable. The PPIC database does not contain information on the nature of these supplementary benefits; for that reason they will not be valued. (Additional benefits received prior to age 65 from plans that are integrated with the C/QPP will be valued, as described in example 3.)

APPENDIX D - SOURCE QUESTIONS FROM THE SURVEY OF FINANCIAL SECURITY AND PENSION PLANS IN CANADA

The questions used as source information are given below.

Survey of Financial Security

The following questions were asked of all persons in the selected household 15 (or 25) years of age and older.

A3 **What is ...'s age?**

A5 **What is ...'s marital status?**

Married
Living common-law
Separated
Divorced
Widowed
Single, never married

Questions for Current Plan Members

F15 **Through this employment does ... participate in any of the following** :

(a) a group RRSP?
Yes
No

(b) a Deferred Profit Sharing Plan (DPSP)?
Yes
No

(c) an employer or union sponsored pension plan, other than the Canada or Quebec
Pension Plan?
Yes
No

F16 **The following questions will help us to determine the provisions of ...'s pension plan and understand how important these plans are to the financial security of Canadians.**

(a) What is the name of ...'s employer pension plan?

(b) What is the registration number of this plan?

(c) How much did ... contribute to this plan in 1998?

(d) What was ...'s pension adjustment in 1998?

(e) For how many years and months has ... been a member of that plan?

Include
- all time in this plan even if with a previous employer;
- time that was bought back

Exclude • periods not covered by the plan (e.g., maternity leave not bought back, temporary layoff, etc.)

Questions related to Deferred Pensions

G2 **Other than a pension plan you may already have mentioned, in the past did ... belong to any other employer pension plans?**

Do not consider:

- the Canada or Québec Pension Plan
- a group RRSP;
- a Deferred Profit Sharing Plan (DPSP).

G3 **To how many such plans did ... previously belong**

One
More than one (enter number of plans)

G4 **The next few questions refer to the plan which ... belonged the longest**

G5 **Is ... currently receiving benefits from this plan?**

Yes
No

G6 **When ... left this plan, what happened to funds that had accumulated in it? Were they**

Left in the plan?
Transferred to a new employer pension plan?
Transferred to an RRSP?
Returned to ... in a lump sum?
Other – specify?

G8 **For whom did ... work when he/she belonged to this plan?**

G9 **What kind of business, industry or service was this?**

G10 **In what year did ... stop working for this employer?**

G11 **<u>In the last full year</u> that ... worked for this employer what were ...'s total earnings, before taxes and other deductions? Exclude any commissions, tips, bonuses or paid overtime.**

G12 **For how many years and months was ... a member of that employer pension plan?**

Include • all time in this plan even if with a previous employer;
• time that was bought back
Exclude • periods not covered by the plan (e.g., maternity leave not bought back, temporary layoff, etc.)

G13 **Has part of this pension been, or will it be, split with a former spouse/partner?**

Yes
No

Questions related to Pensions In Pay

H5 **Is this a pension benefit from a previous employer or is it a spouse's or survivor benefit?**

H8 **Does this pension plan provide a bridge benefit?**

Yes
No
Don't know

H9 **What is the monthly amount of the full pension benefit?**

Indicate if amount reported is gross or net

H10 **Is this pension indexed? In other words, does or will the amount of the pension increase?**

Yes
No

H11 **Does this increase occur:**

Every year?
Less often than every year?
Have not yet had an increase?
Other? Specify

H12 **Is that increase:**

Equal to the increase in inflation?
Equal to only part of the increase in inflation?
A set percentage?
At the employer's discretion?
Other? Specify

Questions related to Income

During 1998 what was ...'s income from the following sources?

J2a **Wages and salaries from all jobs before deductions. Include commissions, tips, military pay and allowances.**

J2b **Does this amount include any income from commissions or tips?**

Other Information

J26 **What were ...'s Registered Retirement Savings Plan (RRSP) contributions?**

Pension Plans in Canada

The following information is provided on all RPPs in Canada.

7 Type of organization of principal employer(s)

Public Sector	**Private Sector**
Municipal government	Incorporated company
Municipal enterprise	Unincorporated business (sole
Provincial government	proprietor or partnership)
Provincial enterprise	Co-operative
Federal government	Trade or employee association
Federal enterprise	Religious, charitable or other non-profit
Other	organization
	Other

16 Type of plan *(pension formula for current service)*

Final average earnings over last __ years
Average best earnings – for the best __ years
Average best earnings – for the best __ years of the last __ years
Career average earnings – year earnings base last updated ____
Earnings indexed yes no
Flat benefit
Money purchase
Profit sharing
Hybrid – better of defined benefit/defined contribution
Composite/combination
Other

17 Employee contribution rate – current service

No contributions required
__ % of earnings (not integrated)
__ % of earnings less the required C/QPP contributions
__ % of earnings up to YMPE or on which contributions to C/QPP are required and
__ % on balance of earnings
$____ per year
Cents per hour
Up to 18% of earnings (together with employer contributions), as prescribed by the Income Tax Act
Variable
Other

19 Employer contribution rate – current service

Balance of cost of pension, i.e. defined benefit plan (other than modified defined benefit)
As specified in collective agreement (use only for modified defined benefit plans, if specific rate is not known)
__ % of earnings (not integrated)
__ % of earnings less the required C/QPP contributions
__ % of earnings up to YMPE or on which contributions to C/QPP are required and
__ % on balance of earnings
$____ per year
Cents per hour

Based on employer profits with minimum of __ % of employee's earnings
Up to 18% of earnings (together with employer contributions), as prescribed by the Income Tax Act
Variable
Other

20 Current service benefits

Defined contribution plan, i.e. benefit not prescribed
__ % of earnings for each year of service (not integrated)
__ % of earnings for each year of service less all or part of C/QPP pension
__ % of earnings up to YMPE or on which contributions to C/QPP are required and __ % on balance of earnings for each year of service
$ ____ per month for each year of service
$ ____ per month for __ hours worked
Combination of benefit formulae
Variable
Other

28 Automatic adjustment to pensions provided for in plan

No automatic adjustment provided for in plan
Based on full consumer price index (CPI)
Based on partial CPI
Based on excess interest earnings
Percentage increase (not based on CPI)
Flat dollar increase annually
Other

33 Death benefits after retirement – normal form of pension for single pensioner

Life annuity
Pension guaranteed for __ months
Employee contributions less pension payments made
Total contributions less pension payments made
Other

34 Death benefits after retirement – for married pensioner

a) Is joint and survivor or spouse's pension provided (if not waived)

Yes, at __ % of retiree's pension
No

b) If yes, is the initial pension benefit reduced to provide this type of benefit?

APPENDIX E - CONSULTATION PROCESS: COMMENTS RECEIVED ON THE DISCUSSION PAPER

The discussion paper proposing the methodology for valuing employer pension plan benefits was sent to approximately 60 people. The availability of the paper was also announced in the Statistics Canada Daily, to provide others with the opportunity to comment.

The comments received indicated general agreement with the overall approach taken to valuing RPP benefits. There were, however, some specific suggestions. These were reviewed with persons who developed the original methodology for estimating the pension value, Michael Cohen and Hubert Frenken.

The major points make by those who submitted comments, together with the response to those comments/suggestions, are summarized below.

1. Use of termination versus going concern method

   In the discussion paper the potential users of the information were specifically asked whether they would prefer the value of the RPP to be calculated using a termination or going concern approach. (The difference between the two is explained in section 2.3.3 of this document.) For the most part, those who commented on the discussion paper agreed with the use of the termination valuation method. This approach is more consistent with the basis on which other assets are valued, in that future expectations are not taken into consideration and current market conditions are used to estimate the value. The termination approach, however, can underestimate the value of the benefit earned (accrued) as of the time of the survey because many employees will continue to participate in the plan, and therefore receive a pension based on their salary closer to the time of retirement. In order to allow users the option of selecting the value of the RPP that is most appropriate for their type of analysis both values will be produced. The basic output from the survey will use the termination value but the going concern value will also be available.

2. Factors

   Again, there was general agreement with the factors proposed in the discussion paper. However, the factor used for partially indexed plans (on a termination basis) assumed partial indexing of 25% of the CPI. Several people felt this was too low and that a better assumption to use would be partial indexing of 50% of the CPI. This changes the interest rate used to determine the factors for partially indexed plans from 5.62% to 4.99%. Consequential changes were therefore made to the factors shown in Appendix B for the partially indexed factors under "Termination valuation".

3. Benefit limits

   The *Income Tax Act* limits RPP benefits to $1,722.22 per year of service. (This limit is equivalent to an annual pension of approximately $60,000 after 35 years of service.) This limit was not incorporated in the original methodology. This has been changed and this limit will be used when estimating the value of benefits for those who were members of defined benefit plans at the time of the survey and for those who were receiving benefits. For those belonging to defined contribution plans at the time of the survey, the PA or combined employer and employee contributions will be limited to $13,500 or 18% of 1998 earnings.

4. Contribution rates for defined contribution plans

In the discussion paper it was proposed that, when valuing the benefits of defined contribution plans (and therefore deferred pensions), a contribution rate of 5% by the employee and also the employer be assumed if the PA and the contribution rate are not known. This was determined from the Pension Plans in Canada database, using the most common rate. It was suggested that this rate is too high; the average rate, again from the Pension Plans in Canada database, is 4.1% by the employer and 3.1% by the employee. (The employee rate is lower because many of these plans do not require any contributions by the employee.) The methodology has been changed to use the average rate.

5. Characteristics of typical industry plans

Several changes were suggested to the characteristics of the typical industry plans indicated in Chart 2 of the discussion paper. Those changes are:

a) that the plans in the transportation, communications, other utilities, finance, insurance and real estate industries be changed from "not integrated" to "integrated";
b) that the assumed contribution rate for defined contribution plans be lowered from 5% by the employer and the employee.

Both of these changes have been made and appear in Chart 2 of this document . These provisions will be used only if the pension plan to which the respondent belongs cannot be identified.

6. Unisex mortality tables

The use of unisex mortality tables was questioned in one response to this document. The assumption of unisex mortality was made to simplify the calculation procedure. Differences certainly exist in the mortality patterns of men and women. Michael Cohen has estimated that the following difference in value will result using unisex and sex-distinct assumptions:

- for pensions providing a life annuity the estimate for females would be about 8% higher and for males 8% lower using sex-distinct mortality tables rather than unisex tables;
- for pensions providing a joint and survivor annuity (expected to be much more common) the differences would be much smaller (for females, 0%-2% higher and for males 0%-2% lower using sex-distinct mortality tables rather than unisex tables).

Given that the valuation must be done using a number of assumptions (e.g., interest rates, inflation) and using somewhat simplified plan provisions, the use of unisex mortality tables is felt to generate estimates within an acceptable range of precision.

7. Valuing integrated defined benefit plans

In valuing the benefits of integrated defined benefit plans the value of the C/QPP benefit must be deducted from the value of the RPP. In doing this, the original methodology calculated the value of the C/QPP using the 1998 YMPE as the salary limit. It was suggested that this be modified as the C/QPP is determined using as the limit the YMPE averaged over a number of years. Therefore a limit of $36,033 will the used, the average of the YMPE for 1996, 1997 and 1998.

It is recognized that it is very difficult to generate an RPP value that will meet the needs of all potential users of this information. As was stated in the Introduction of this document, every attempt was made to simplify the calculation process, to help ensure that this estimation can be successfully done. Even so, the methodology is quite precise in many ways; it takes into account many details specific to each individual (e.g., age, length of plan membership, salary, marital status and plan provisions such as contribution and benefit rates, death benefits and indexation provisions). In order to allow users to generate their own estimate, the variables used in the estimation process will be made available. In that way, users of the information will be able to make modifications to the variables and generate their own estimates.